15. AGRICULTURAL LABOUR AND FARM SUBSIDIES: NEW EVIDENCE FROM THE EU

ALESSANDRO OLPER, VALENTINA RAIMONDI, DANIELE CAVICCHIOLI AND MAURO VIGANI[*]

This chapter summarises the main results reported in Olper et al. (2013), who investigated the relationship between CAP subsidies and the reallocation of agricultural labour. Exploiting the properties of a large data set covering 150 EU regions during the 1990-2009 period, this study found robust evidence that CAP payments contributed significantly to maintaining jobs in agriculture. However, the economic magnitude of this effect is quite low, and strongly heterogeneous across different CAP payments, i.e. Pillar I subsidies exert an effect more than two times greater than Pillar II payments.

1. Introduction

The creation and maintenance of jobs in agriculture and in rural areas has been a traditional CAP target, and an objective recently re-stated and emphasised by several EU official documents (e.g. European Commission, 2010; European Parliament, 2010).[32] However, the effectiveness of subsidies

[*] This chapter is based on Olper, Raimondi, Cavicchioli & Vigani, "Does the Common Agricultural Policy Reduce Farm Labour Migration? Panel data analysis across EU regions", Factor Markets Working Paper No. 28, July 2012.

[32] The European Commission reflection on the future of the CAP, "The CAP Towards 2020" (EC, COM(2010) 672), explicitly addressed agricultural and rural labour issues in several sections of the document. Labour and rural areas

in maintaining the labour force in the agricultural sector is unclear and the empirical evidence is still largely inconclusive. Over the last 50 years, EU countries have experienced dramatic adjustments in their agricultural labour markets, showing an impressive off-farm migration. Surprisingly, in the most recent decades, we do not find any substantial reduction of the migration rate, a stylised fact that is at odds with €50 billion per year of income subsidies spent through the Common Agricultural Policy (CAP).

During the 1990–2009 period, the off-farm migration rate across the EU-15 regions was about 2.5% per annum.[33] This average value masks substantial differences both over time and, especially, across countries and regions. The off-farm migration rate was equal to 3.02% over the 1990–99 period, going down to 2.06% in the period 2000–09. However, this lower rate is largely attributable to a value close to zero in 2008 and even slightly negative in 2009, probably as an effect of the 2008 commodities price spike and of the 2009 global crisis. Across EU regions, the net farm migration rate shows great variation (Figure 15.1). Consistent with expectations, there is a negative relationship between the level of development and the rate of off-farm migration, as less developed regions are still in structural transformation. However, this negative relation is weak.

A central question analysed in this chapter is the extent to which farm subsidies played a role in affecting these patterns of off-farm migration. Mainly due to data limitations, existing evidence concerning the effect of CAP subsidies on off-farm labour migration has been quite inconclusive. This evidence is mostly confined to specific countries or regional case studies, only rarely focusing on the European-wide perspective (Shucksmith et al., 2005; Petrick & Zier, 2011; 2012). Thus, although interesting and often rich in detailed interpretations, such studies only measure the CAP effects within a single country or region, an approach that has the advantage of keeping factors such as institutions fixed. However, these studies are difficult to generalise to other countries and regions where there are wide differences in development, labour market institutions and farming structures.

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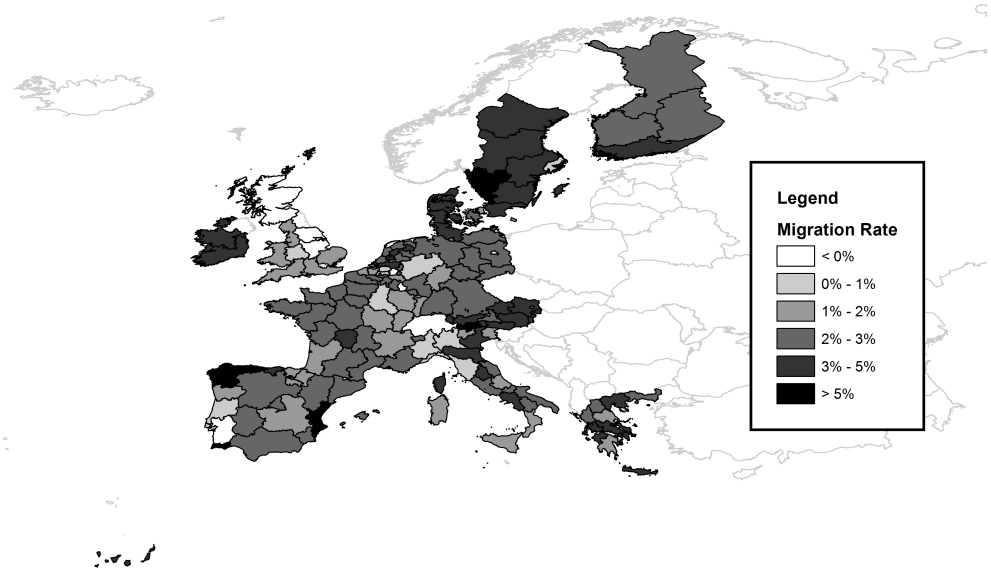
employment issues are also well represented in the recent European Parliament document on CAP reforms, "On the Future of the CAP after 2013" (EP 439.972).

[33] Regional off-farm migration rate, m, is estimated as $m = [L_{it-1}(1+n) - L_{it}]/L_{it-1}$, where L_{it} is the stock of agricultural labour in the region i and year t, and $n = (L_t - L_{t-1}/L_{t-1})$ is the growth rate of the total labour force. See Olper et al. (2012) for details.

Figure 15.1 Average annual off-farm migration rate, 1990–2009



Source: Authors computation based on data from Olper et al. (2012).

This chapter summarises the main findings reported in Olper et al. (2012) on the effect of CAP subsidies on off-farm migration across the EU regions. The chapter starts with a short review of the empirical literature to date. In Section 3, after a non-technical discussion of the method, key results are presented in term of the estimated off-farm migration elasticity to CAP payments. Finally, Section 4 concludes.

2. The empirical literature to date

Table 15.1 summarises the empirical literature on the effect of farm subsidies on the agricultural labour market. Theoretically, these studies can be divided into two main approaches: studies based on household models to analyse the impact of subsidies on the allocation of household labour (Lee, 1965; Becker, 1965); and those based on models of occupational choice to investigate the process of entry and exit from the agricultural sector (Todaro, 1969; Harris & Todaro 1970; Mundlak, 1979). The above distinction is also reflected in empirical works, with studies at the farm-household level largely based on micro farm-level data, and studies on the inter-sectoral reallocation of agricultural labour conducted at the aggregate (country or regional) level.

Table 15.1 The labour effect of farm payments: The literature to date

Author	*Country*	*Data level*	*Empirical methods*	*Period*	*Data structure*	*Output variable*	*Type of Subsidy*	*Subsidy net Effect*	*Additional information*
Barkley (1990)	US	Aggregate	OLS	1940-1985	Time series	Out farm labour migration	Direct payments	0	
Goetz and Debertin (1996)	US	Aggregate	OLS	1980-1990	Cross-section	Population out-migration	Federal farm program payments	+	
Mishra and Goodwin (1997)	Kansas	Household	Tobit	1992	Cross-section	Off-farm labour supply	Federal farm program payments	–	
Goetz and Debertin (2001)	US	Household	OLS	1987-1997	Cross-section	Net farm exit rate	Federal farm program payments	–	
Goodwin and Holt (2002)	Bulgary	Household	Probit + others	1995	Cross-section	Off-farm work participation	Social benefit payments	–	
Pietola *et al.* (2003)	Finland	Household	Multinomial Probit	1993-1998	Panel	Out farm labour migration	Per hectar subsidies	0	
El-Osta *et al. (* 2004)	US	Household	Tobit	2001	Cross-section	On-farm labour supply	AMTA, loan deficiency, disaster and market loss payments	+ (on-farm) − (off-farm)	Heterogeneity effects across subsidies
Foltz (2004)	Connecticut	Household	Probit	1996-2001	Panel	Farm exit rate	Price support subsidies	–	
Goodwin and Mishra (2004)	US	Household	OLS	2001	Cross-section	Off-farm labour supply	Decoupled payments	–	
Serra *et al.* (2005)	Kansas	Aggregate	Probit	1994-2000	Cross-section	Off-farm labour supply	Decoupled payments	0	
Glauben *et al.* (2006)	Germany	Household	OLS	1991-1999	Cross-section	Out farm labour migration	Sectoral subsidies payments	0	
Benjamin and Kimhi (2006)	France	Household	Multinomial Logit	2000	Cross-section	On-farm work participation	Direct payments for young farmers	–	
Ahearn *et al.* (2006)	US	Household	Probit	1999 vs. 1996	Cross-section	Off-farm work participation	Coupled and decoupled payments	–	
Key *et al.* (2006)	US	Household	OLS	1992 and 1997	Cross-section	Off-farm labour supply	Federal crop insurance subsidies and total government payments	−	
Breustedt and Glauben (2007)	110 EU regions	Aggregate	OLS	1993-1997	Cross-section	Out farm labour migration	Direct payments and price support	–	
Dewbre and Mishra (2007)	US	Household	OLS	1998-2001	Cross-section	On farm work	AMTA, loan deficiency, disaster and market loss	– (AMTA) + (coupled)	AMTA are decoupled, other subsidies coupled
Goodwin *et al.* (2007)	US	Household	Probability-weighted bootstrapping	2003-2004	Cross-section	Off-farm labour supply	Coupled and (decoupled) payments	− (decoupled) + (coupled)	
Hennessy and Rehman (2008)	Ireland	Household	Probit /OLS	2002	Cross-section	Probability (hours) of off-farm participation	Decoupled payments	+	
Gullstrand and Tezic (2008)	Sweden	Household	Logit	1989-2003	Panel	Out farm labour migration of salaried	Objective 1 Structural Funds Programme	0	
Pufahl and Weiss (2009)	Germany	Household	Propensity Score Matching	2000-2005	Panel	On-farm labour supply	Agri-environment programs	+	
Van Herck (2009)	144 EU Regions	Household	Logit	2005-2006	Cross-section	Out farm labour migration	Coupled and decoupled payments	+	
Uchida *et al* . (2009)	China	Household	D-in-D Matching	1999-2004	Panel	Off-farm labour supply	Payment for ecosystem service	+	
Becker *et al.* (2010)	EU NUTS 2	Aggregate	Regression Discontinuity Design	1989–2006	Cross-section	Total Employment growth	Objective 1 Structural Funds Programme	0	
D'Antoni and Mishra (2010)	US	Aggregate	Autoregressive distributed lag	1940-2007	Time series	Out farm labour migration	Direct payments	–	
Petrick and Zier (2011)	3 East-Germany landers	Aggregate	LSDV	1999-2006	Panel	Out farm labour	Coupled, decoupled and rural development CAP payments	+ (0 livestock payments)	Heterogeneity effects across subsidies
Salvioni and Sciulli (2011)	Italy	Household	Propensity Score Matching	2003-2007	Panel	On-farm family labour	Rural development Program	+ (0 LFA)	
Petrick and Zier (2012)	3 East-Germany landers	Aggregate	GMM	1999-2006	Panel	Out farm labour	Coupled, decoupled and rural development CAP payments	0	
Corsi and Salvioni (2012)	Italy	Household	Tobit	2002-2008	Panel	Off-farm labour participation	Decoupled payments	0	

Micro-data allow us to address individual adjustment behaviour in response to changes in factors affecting household utility, such as different revenues sources. For example, Mishra & Goodwin (1997), focusing on farm households in Kansas, found that policy changes that reduce farm income support can increase off-farm employment of the operators and

their spouses. Similarly, El-Osta et al. (2004) showed that US Agricultural Market Transition Act (AMTA) payments tend to increase the hours operators work on-farm and *vice versa*. The majority of farm-level studies are based on a cross-sectional approach. However, there are also important examples of micro-data analysis based on panel data (Pietola et al., 2003; Gullstrand & Tezic, 2008). One of the main shortcomings of these studies is the short time period normally involved, an issue that makes it difficult to isolate all the farmer adjustment processes due to the changes in agricultural policy (Glauben et al., 2006).

The analysis at the aggregate level is, in principle, less data constrained, providing results with broader coverage. The process of labour migration from one sector to another is assessed by controlling for structural variables such as country or regional relative income, unemployment, population densities, and institutional and policy variables. The econometric approaches of aggregate studies range from cross-sectional to time-series analyses and, more recently, to panel data methods and also quasi-experimental approaches.

The seminal work of Barkley (1990) used a two-sector occupation choice model on a large time series (from 1940 to 1985) to analyse the labour migration out of agriculture in the US, using government payments as a key variable. Results show that the effect of farm support on agricultural labour is negative but insignificant. D'Antoni & Mishra (2010) extended Barkley's sample to 2007, accounting also for dynamics, through an autoregressive distributed lag model. By taking dynamics into account, the farm support effect on off-farm labour migration becomes significantly negative.

At the EU level, many studies have investigated the effect of CAP payments, as well as of specific national public policies (see Table 15.1). From both household and aggregate level studies, the evidence of the direct (and indirect) effect of CAP subsidies on off-farm labour participation/migration is inconclusive, ranging from negative even to positive. Moreover, results are often confined to specific countries or regions (Pufahl & Weiss, 2009; Hennessy & Rehman, 2008; Gullstrand & Tezic, 2008), mainly as a consequence of data limitation at the EU regional level. Several studies used a cross-sectional approach (e.g. Breusted & Glauben, 2007; Hennessy & Rehman, 2008; Van Herck, 2009), while those which performed a panel data analysis considered only a single country and/or specific policy measures (e.g. Gullstrand & Tezic, 2008; Pufahl & Weiss, 2009; Salvioni & Sciulli, 2011).

Only a few studies have worked at the overall EU level. Breusted & Glauben (2007) investigated the effect of total farm subsidies on off-farm labour migration in 110 EU NUTS 2 regions, finding that CAP payments slowed down structural change in the period 1993–97. Van Herck (2009) used a multinomial logit approach to investigate the main destination of households exiting the agricultural sector. Coupled, decoupled and total subsidies showed a positive effect on off-farm migration for 144 NUTS 2 EU regions, mainly as a consequence of secondary order effects. Finally, within this literature the works of Petrick & Zier (2011; 2012) represent two relevant exceptions. They used difference-in-difference and dynamic panel models, respectively, and exploited the entire portfolio of CAP payments, showing an employment effect on CAP subsidies which goes from weak but positive to zero. However, their results focused on just three East German regions and are hardly extendible to the EU as a whole.

To sum up, actual evidence concerning the effect of CAP payments on off-farm migration is not only quite inconclusive, but also suffers from several drawbacks. First, the evidence often comes from cross-sectional inference, and when panel data are used the time coverage is short. Second, it is largely focused on country or regional case studies whose findings are difficult to generalise to other countries and regions. Third, it rarely takes into account the entire portfolio of CAP payments. Last, but not least, no particular effort has been taken to account for potential problems of endogeneity bias of CAP payments.

3. New evidence on the CAP subsidies effect on agricultural labour

3.1 Theoretical and empirical background

From a theoretical point of view, Olper et al. (2013) rely on the theory of occupational choice and labour migration decision, which has its roots in the Todaro (1969) and Harris & Todaro (1970) two-sector model, subsequently developed by Mundlak (1979) and Barkley (1990). In this model, there is no room for uncertainty, capital market restrictions and adjustment costs (see Breustedt & Glauben, 2007).

The economy is disaggregated into two sectors: agriculture (i) and non-agriculture (j). Individuals choose between working in the agricultural or the non-agricultural sector by comparing their expected discounted lifetime utility in the two sectors. Assuming that the price of the composite consumption good equals one, the utility (V) derived from one occupation

is a function of the expected income (Y) and the time spent working (L), plus exogenous shifters (Z). An individual selects one occupation over the other at time t, such that $\max \int e^{-rt} V(Y_t, L_t, Z_t)dt$, with r the discount rate, and $\partial V/\partial Y > 0$.

Thus, when the income level in non-farm occupation is higher than that in the farm sector, farmers are expected to move away from agriculture. However, even though non-farm income may be higher than that associated with farming, such a difference may be discounted by the probability, q_{jt}, of finding a job in the industrial sector. The off-farm migration will occur when the expected lifetime utility in the non-farm sector – net of the costs C_t associated with changing job – exceeds the expected lifetime utility in farming. The net migration out from agriculture, m, is then a function of the arguments of the utility functions in the two sectors, and includes the income, the labour force, the probability of finding a job, the costs of migration, the age structure, g, and other personal characteristics of the farm population, namely $m = f(Y, L, Z, q_j, C, g)$.

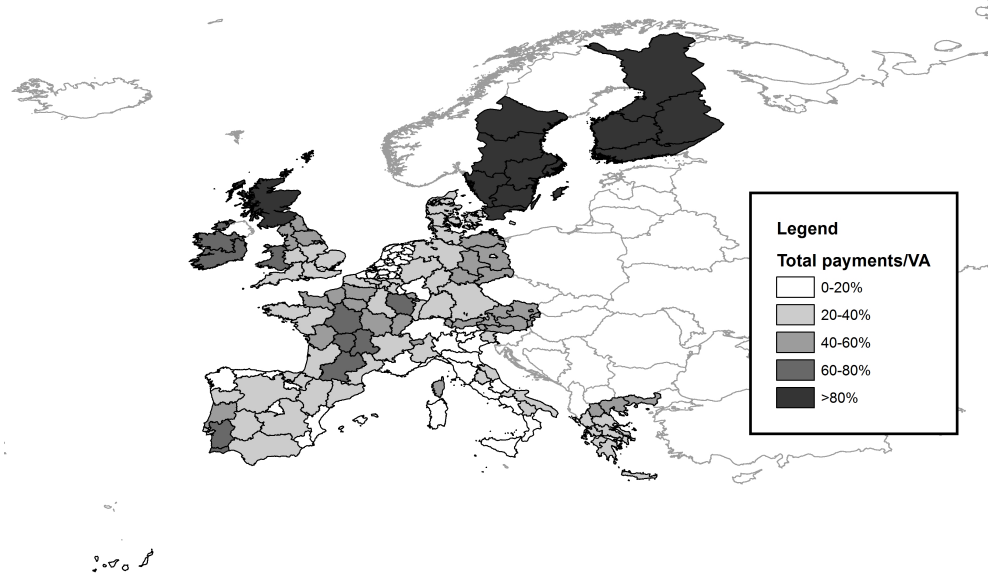
Next, defining the relative income between the non-agricultural and agricultural sectors by $ri = Y_j/Y_i$, clearly the theoretical model predicts that $\partial m/\partial ri > 0$. Thus, other things being equal, to the extent to which farm subsidies, s, will contribute to a shrink in relative income, they will negatively affect off-farm migration, namely $\partial m/\partial s < 0$. The empirical identification of this *direct effect* of farm subsidies on off-farm migration, together with other effects on the demand for agricultural labour, represented one of the main objectives of the Olper et al. (2012) study.

The predictions above have been tested econometrically in a sample of 150 EU-15 regions in the period 1990–2009, using both static and dynamic panel estimators, to account for the adjustment nature of the migration process and the possible endogeneity of CAP payments. Empirically, one of the main challenges is how to measure the policy variables at the regional level.[34] To overcome these issues, the study

[34] Previous studies followed two main approaches: measuring a regionalised producer subsidy equivalent (PSE) as in Anders et al. (2004), Tarditi & Zanias (2001) and Hansen & Herrmann (2012); using FADN data as in Shucksmith et al. (2005), and combining the same source with Eurostat Regio-New Cronos database, assuring to the former also a time variation, as in Esposti (2007). However, as discussed in Olper et al. (2012) both these approaches have some limitations, especially due to the impossibility of investigating the possible differentiated effect

adopted a new strategy, measuring CAP payments over the net farm income using only Farm Accountancy Data Network (FADN) data at the regional level. The key advantage of this approach is the possibility of splitting CAP total payments into their different components: coupled and decoupled payments of Pillar I, as well as agri-environmental payments, less-favoured areas (LFA), investment aids and a residual category called 'other' subsidies of Pillar II.

Figure 15.2 Average CAP payments over farm income, 1990–2009



Source: Authors computation based on data from Olper et al. (2012).

For illustrative purposes, Figure 15.2 reports the 1990–2009 average amount of total CAP payments relative to farm income (payments/VA) received by the considered EU regions. The pattern that emerges is quite close to previous findings (e.g. Shucksmith et al., 2005). In particular, there is strong variability in the amount of farm income due to CAP payments. The average level in the considered period (33%) masks a large variability across regions, which range from close to 0% to above 80%, especially in some central and northern Europe regions. However, the correlation between the distribution of CAP support and the level of development,

between coupled and decoupled payments, as well as the effect of different Pillar II subsidies

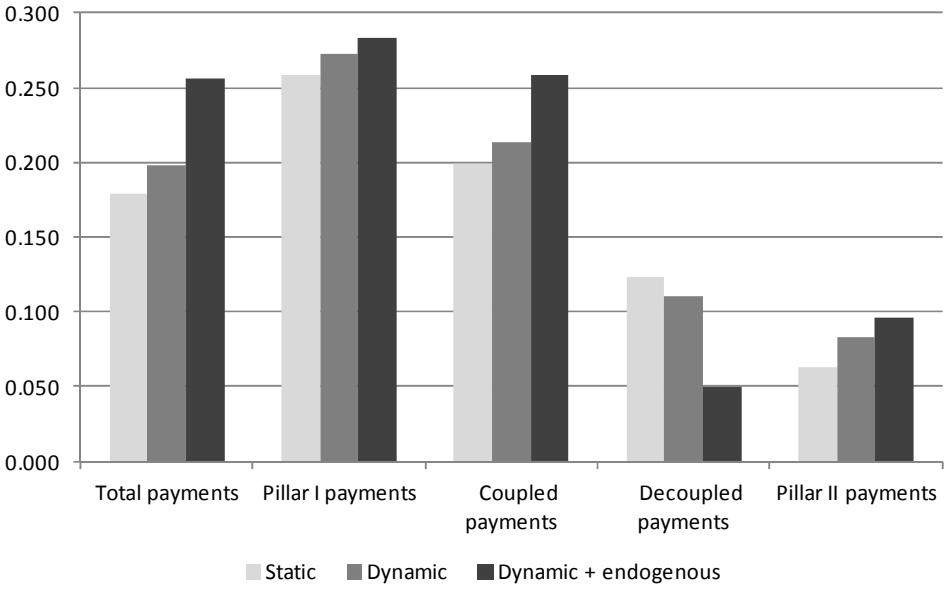
measured as real GDP per capita, is always very low: −0.084 for total CAP subsidies, −0.152 for Pillar I payments, and 0.05 for Pillar II payments.

3.2 Main findings

Overall, the econometric results strongly support the model predictions, namely that CAP subsidies as a whole have played a role in keeping labour forces in agriculture. However, the economic magnitude of the overall effect is not particularly high and, interestingly, strongly heterogeneous across different CAP payments. A simple comparison between the off-farm migration effects of CAP payments is reported in Figures 15.3 and 15.4, using the respective (absolute) elasticities, estimated from the econometric regressions reported in Olper et al. (2012).[35] Several interesting patterns emerge. First, a 10% increase in total CAP payments leads to a decrease in off-farm migration of about 1.72% when the effect is estimated using the static fixed effects model. The value rises to 1.90% and 2.46% when dynamics and endogeneity are accounted for. Considering our preferred estimate coming from the dynamic model, that controls for the endogeneity of CAP payments, meaning that, without subsidies, the EU-15 net off-farm migration rate would be equal to 3.2% per year, instead of the current 2.5%.

[35] These elasticities are estimated at the sample mean using the following formula: $\frac{\partial \ln m}{\partial \ln s} = \beta \frac{\bar{s}_{it}}{\bar{m}_{it}}$, where $\bar{s}_{it}$ and $\bar{m}_{it}$ are, respectively, the sample mean of the specific CAP subsidy and of off-farm migration, while β is the estimated marginal effect of the CAP subsidy. Note that, to make figure 3 and 4 more readable, we report *absolute* elasticities, although all the estimated elasticities of farm migration to CAP payments are negative, but the elasticity to investment aids is positive and always significant.

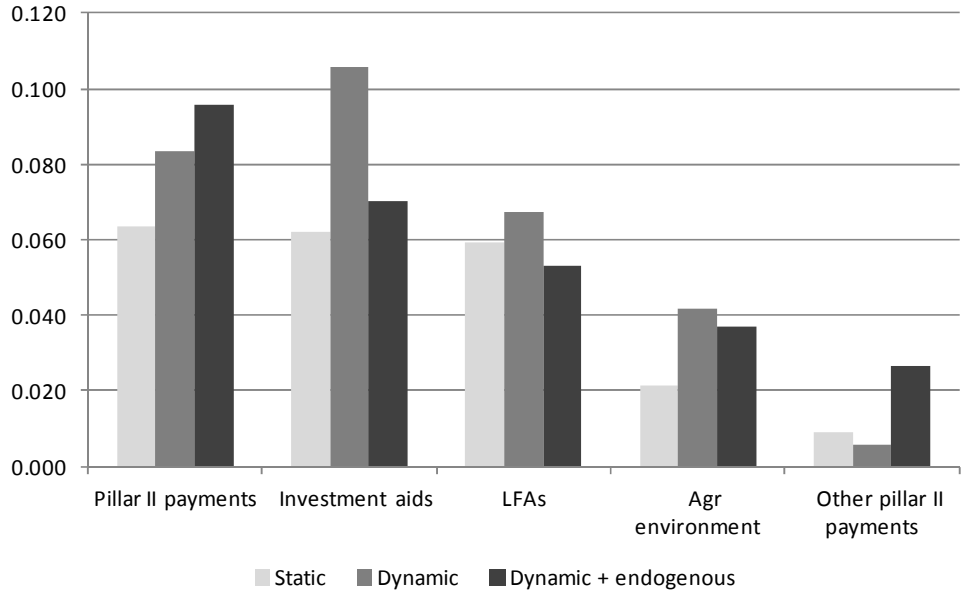
Figure 15.3 Off-farm migration elasticity to CAP payments



Notes: The figure reports the (absolute) elasticity of off-farm migration to CAP payments, namely the percentage reduction in off-farm migration for an increase of the respective CAP subsidies of 1%. This is because the estimated elasticity are always negative. The term Static, Dynamic, and Dynamic+endogenous refer to the econometric approach used to estimate the underline parameters. See Olper *et al.* 2013, for details.

Source: Authors computation based on data from Olper et al. (2012).

Figure 15.4 Off-farm migration elasticity to Pillar II payments



Notes: The figure reports the (absolute) elasticity of off-farm migration to CAP payments, namely the percentage reduction in off-farm migration for an increase of the respective CAP subsidies of 1%. This is because the estimated elasticity are always negative, but the investments aids subsidies. The term Static, Dynamic, and Dynamic+endogenous refer to the econometric approach used to estimate the underline parameters. See Olper et al. 2013, for details.

Source: Authors computation based on data from Olper et al. (2012).

This average effect cancels out relevant differences across CAP instruments. The long-run elasticity of Pillar I payments, equal to about 0.274% when dynamics and endogeneity are considered (column 3), is indeed about 2.7 times higher in absolute value than the elasticity of Pillar II policies. Within Pillar I, the coupled payments display higher absolute elasticity than decoupled payments, while across Pillar II instruments, investment aids display the highest absolute elasticity to off-farm migration, and this elasticity is the only one with a positive effect. Thus, considering the value of the above elasticities, one can conclude that, if the labour effect of CAP payments is high on the EU policy agenda, then the most effective policy tools to reach this objective would be coupled payments, followed by decoupled payments, *ceteris paribus*.

Another way of interpreting the economic magnitude of these findings is through a back-of-the-envelope calculation. Olper et al. (2012),

focusing on the off-farm migration effect of total CAP payments, found the following numbers. Every year, CAP payments prevented a flow of off-farm migration of around 27,000 agricultural workers. In percentage terms, this means a reduction in farm labour migration ranging from a minimum of about 6%, in the more conservative estimate, to a maximum of 20%.[36] Therefore, a conservative view is to interpret these numbers as saying that CAP subsidies might generate a reduction in off-farm migration, although the effect can be rather moderate.

4. Concluding remarks

Understanding the effect of CAP policies is important, as a deeper comprehension of their incidence would allow the design of better policies. This chapter has summarised the main findings reported in Olper et al. (2013), who investigated how different CAP subsidies affected off-farm migration across 150 EU regions over the period 1990–2009. Within the standard neo-classical two-sectors models, inter-sectoral labour migration is affected by across-sector income differences, *ceteris paribus*. Thus, as far as CAP subsidies have been effective in transferring income to farmers, they should have contributed to a reduction in the rate of off-farm migration. We find strong support for this expectation.

An interesting implication of the study, which comes from the structure of the conceptual model, is related to the 'efficiency' of CAP payments in transferring income to farmers. Although several previous works have documented an overall inefficiency of (coupled) agricultural payments (e.g. OECD, 2001), our results seem to partially contradict this conclusion. This appears in line with most recent evidence showing that farmers gain from 60% to 95% of the value of CAP coupled payments, and only a marginal fraction of such payments is capitalised in land rent (Michalek et al., 2011).

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[36] This values range is obtained taking into account of the confidence interval of our estimation, namely its uncertainty.

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